RESEARCH REPORT

Adult outcomes of binge drinking in adolescence: findings from a UK national birth cohort

R M Viner, B Taylor

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See end of article for authors' affiliations

Correspondence to: Dr. Russell Viner, Department of Paediatrics, University College Hospital, 250 Euston Road, London NW1 2PG, UK; R.Viner@ich.ucl.ac.uk

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Aims: The aim of the study was to determine outcomes in adult life of binge drinking in adolescence in a national birth cohort.

Design and setting: Longitudinal birth cohort: 1970 British Birth Cohort Study surveys at 16 years (1986) and 30 years (2000).

Participants: A total of 11 622 subjects participated at age 16 years and 11 261 subjects participated at age 30 years.

Measurements: At the age of 16 years, data on binge drinking (defined as two or more episodes of drinking four or more drinks in a row in the previous 2 weeks) and frequency of habitual drinking in the previous year were collected. Thirty-year outcomes recorded were alcohol dependence/abuse (CAGE questionnaire), regular weekly alcohol consumption (number of units), illicit drug use, psychological morbidity (Malaise Inventory) and educational, vocational and social history.

Findings: 17.7% of participants reported binge drinking in the previous 2 weeks at the age of 16 years. Adolescent binge drinking predicted an increased risk of adult alcohol dependence (OR 1.6, 95% CI 1.3 to 2.0), excessive regular consumption (OR 1.7, 95% CI 1.4 to 2.1), illicit drug use (OR 1.4, 95% CI 1.1 to 1.8), psychiatric morbidity (OR 1.4, 95% CI 1.1 to 1.9), homelessness (OR 1.6, 95% CI 1.1 to 2.4), convictions (1.9, 95% CI 1.4 to 2.5), school exclusion (OR 3.9, 95% CI 1.9 to 8.2), lack of qualifications (OR 1.3, 95% CI 1.1 to 1.6), accidents (OR 1.4, 95% CI 1.1 to 1.6) and lower adult social class, after adjustment for adolescent socioeconomic status and adolescent baseline status of the outcome under study. These findings were largely unchanged in models including both adolescent binge drinking and habitual frequent drinking as main effects.

Conclusions: Adolescent binge drinking is a risk behaviour associated with significant later adversity and social exclusion. These associations appear to be distinct from those associated with habitual frequent alcohol use. Binge drinking may contribute to the development of health and social inequalities during the transition from adolescence to adulthood.

The episodic consumption of large amounts of alcohol, generally known as binge drinking,[1] is now at the forefront of public health concerns regarding drinking alcohol in older adolescents, both in the UK[2] and internationally.[3 4] While the term ''binge drinking'' continues to stimulate debate,[5] it remains commonly used in adolescence to describe a single occasion of risky drinking, generally defined as more than four or five drinks in a row.[3 4 6] The prevalence of binge drinking amongst adolescents increased through the 1990s in the UK and many European countries,[4] although overall alcohol consumption amongst adolescents has changed little since the mid-1990s.[7] In the UK, recent national data suggest that 27% of young women and 36% of young men aged 16–24 years binge drink at least once per week,[8] and that binge drinking in this group is strongly associated with criminal and disorderly behaviour after adjustment for socioeconomic factors.[9] Longitudinal data from the US have shown that about one-half of boys and one-third of girls who binge drink during adolescence continue to binge drink in adult life.[6] Data on the continuation of binge drinking from adolescence into adulthood are limited in the UK, although data from the National Child Development Study (NCDS) show that those who drink heavily in adolescence ($\geq$ 7 units per week) are more likely to binge drink in adulthood.[10]

Available data on outcomes of adolescent binge drinking are largely limited to US populations, and little is known about outcomes of binge drinking in European adolescents.[4] Studies of binge drinking trajectories amongst US and Australian adolescents have suggested that the onset of, or an increase in, binge drinking behaviour during adolescence is associated with an increased risk of alcohol abuse/dependence[11 12] and other substance use[11 13 14] as well as poorer educational attainment[11 13 14] and higher involvement in crime[13 14] in the transition to adulthood (age 21–23 years). Other longitudinal and cross-sectional studies have reported that adolescent binge drinking is associated with risky sexual behaviour,[15] school failure[13] and crime and violence,[16] with recent reports suggesting a link with later risk of cardiovascular disease.[17]

It is notable that high regular alcohol consumption is associated with very similar later morbidity to that reported for binge drinking,[18–20] and that binge drinking and high regular alcohol consumption are highly correlated.[4 5] These associations raise the question of whether reported morbidity relating to binge drinking in part or largely reflects morbidity associated with regular high alcohol consumption. This possibility is supported by evidence that intensity of alcohol use and behavioural problems may represent separate elements of problem drinking in adolescence.[21 22]

We used longitudinal data from the 1970 British Birth Cohort to study whether binge drinking in adolescence is associated with poorer socioeconomic, educational, social and psychological outcomes and alcohol and drug abuse in adulthood. We also examined the hypothesis that adolescent binge drinking and frequent habitual alcohol consumption pose separate risks for adverse adult outcomes.

METHODS

Data

The 1970 British Birth Cohort Study (BCS70) is a continuing longitudinal study of infants born between 5 and 11 April 1970, in England, Scotland and Wales and Northern Ireland; 16 567 babies were enrolled, with follow-up at age 5, 10 and 16 years and in 1999–2000 at 30 years. Data were obtained electronically from the UK Data Archive, University of Essex.

Variables

At 16 years, 11 622 surviving cohort members were traced and agreed to participate; however, a national teachers strike and school leaving examinations markedly reduced participation. Family sociodemographic data were collected by parental interview from 7170 subjects (62%), and 6417 (55%) adolescent participants completed self-report questionnaires on alcohol use. Questions included usual frequency of drinking alcohol in the past 12 months, units of alcohol consumed in the previous week and frequency of consuming four or more drinks in a row in the past 2 weeks. As some binge drinking may be normal in adolescence, we followed previous studies[4 12] in defining adolescent binge drinking as two or more episodes of consuming four or more drinks in a row in the previous 2 weeks. Frequent regular alcohol consumption was defined as drinking on two or more occasions per week in the previous year. Despite lower participation, those who completed the alcohol questions in the 16-year survey were representative of those in the birth survey, with minor under-representation from those from the lower social classes (participants from social classes IV and V made up 17.4% of the group at 16 years compared with 20.7% in the birth survey). Self-report data were also obtained on illicit drug use in the previous year and whether young people had been formally cautioned by the police since 10 years of age. Mental health was assessed by confidential self-report completion of the 12-item self-report General Health Questionnaire (GHQ 12), a valid and reliable screen for recent psychological distress.[23]

At 30 years, data were obtained from 11 261 participants through confidential interview or self-report, including ethnicity, occupation, annual net income, regular weekly alcohol consumption (units), use of illicit drugs in the previous year, educational and vocational achievements, marital history, age at first pregnancy and history of significant accidents, school exclusion, homelessness and court convictions since the age of 16 years. High alcohol consumption in the previous week was defined as $>$ 14 units in women and $>$ 21 units in men, in accordance with UK Department of Health guidance. Problems with alcohol were assessed using the CAGE questionnaire (includes questions on Cutting down, Annoyance by criticism, Guilty feeling and Eye-openers), a screening tool validated in general population samples and in which a score of $\geqslant 2$ indicates potential alcohol dependence or abuse.[24 25] Mental health was assessed by confidential self-report of a previous history of mental health problems and completion of the Rutter Malaise Inventory,[26] a 24-item self-completion scale drawn from the Cornell Medical Index and designed to assess psychological morbidity; a score $\geqslant 7$ indicates likely morbidity.[27 28]

At 30 years, outcome data were available in 4911 of those for whom data on alcohol consumption at 16 years were available (1997 males, 2914 females, accounting for 81% of those with alcohol data at 16 years and 44% of those who participated at 30 years). Loss to follow-up at 30 years was not significantly higher in those who reported binge drinking at 16 years (among those who participated at 30 years, 17.8% reported binge drinking at 16 years, which is very similar to the prevalence of binge drinking found in in 16-year survey (17.7%)).

Ethics

Ethical review was not sought for these secondary analyses of anonymised public access data.

Analysis

Differences in adult outcomes between those with a history of adolescent binge drinking and non-binge drinkers were assessed using the chi-squared test after initial tabulation. Logistic regression was then used to estimate the odds ratios (ORs) for risk of each adult outcome predicted by binge drinking. Analyses were first undertaken unadjusted and then adjusted for socioeconomic status (father's social class and maternal educational status at 16 years and own social class at 30 years), given associations between drinking behaviours and socioeconomic status.[4] Analyses were then further adjusted for baseline status at 16 years of the adult outcome under study, where data were available. Third, we repeated each analysis entering frequent binge drinking and habitual frequency of adolescent alcohol consumption as main effects, together with a term for the interaction of frequent binge drinking and regular alcohol consumption. Analyses were undertaken separately for each sex in STATA 8.

RESULTS

Data on the prevalence of reported alcohol consumption, including binge drinking, and socioeconomic status at 16 years are shown, by gender, in Table 1. Males were significantly more likely than females to report binge drinking ($p<0.001$), to report regular drinking twice or more often per week ($p<0.001$) and to report drinking $\geqslant 10$ units of alcohol in the previous week ($p<0.001$). Binge drinking had a strongly positive association with higher frequency of alcohol use in the previous 12 months; of those who regularly drank two or more times per week, 47% reported binge drinking, compared with 15% of those who drank once weekly or less often and 2% of those who never or rarely drank ($p<0.001$).

The associations of frequent binge drinking in adolescence with adult outcomes are shown in Table 2. Adolescent binge drinking was associated with all adult outcomes measured, except for psychological disorder, history of mental health problems and teenage pregnancy, after adjustment for social class and maternal educational status in adolescence and adult social class. Further adjustment for baseline adolescent status of the outcome under study attenuated the finding for smoking and decreased the odds ratio for illicit drug use, but revealed an association between adolescent binge drinking and adult psychological morbidity. Odds ratios and p-values were not materially changed when models for each adult outcome were further adjusted for habitual adult alcohol consumption (number of units drunk per week). No significant interactions by sex were identified. Mean adult annual net income was not significantly related to binge drinking in adolescence in either sex (data not shown).

Table 3 shows logistic regression models for adult outcomes of adolescent frequent binge drinking, adjusted for habitual frequency of adolescent alcohol consumption and an interaction term between binge and regular drinking as well as for socioeconomic status and baseline status for each outcome where appropriate. Frequent binge drinking predicted a higher risk of adult alcohol dependency, weekly alcohol consumption greater than recommended levels, convictions and a history of exclusion from school and leaving school without any qualifications as well as a history of significant accidents, independently of adolescent habitual frequency of alcohol consumption. Binge drinking did not independently predict later smoking or drug use or psychological problems.

Table 1 Prevalence of drinking and sociodemographic variables at 16 years by sex

	Males		Females	
	%	(95% CI)	%	(95% CI)
Occasions of consuming four or more drinks in a row in the previous 2 weeks	n = 2530		n = 3479	
Nil	64	(63 to 66)	70	(68 to 71)
1	15	(14 to 17)	14	(13 to 16)
⩾ 2 (defined as binge drinking)	20	(19 to 22)	16	(15 to 17)
Habitual frequency of alcohol consumption in last year	n = 2569		n = 3512	
Every day	2	(1 to 3)	1	(1 to 2)
Four or five times per week	4	(3 to 5)	4	(3 to 4)
Two or three times per week	20	(18 to 21)	16	(15 to 17)
About once per week	30	(28 to 32)	28	(26 to 29)
About once per month	15	(13 to 16)	13	(12 to 15)
Special occasions only	21	(19 to 22)	29	(28 to 31)
Never drink	9	(8 to 10)	9	(8 to 10)
Alcohol consumed in the previous week (units)	n = 2342		n = 3084	
0	33	(31 to 35)	40	(38 to 41)
1–4	27	(25 to 29)	35	(34 to 37)
5–9	18	(17 to 20)	16	(15 to 17)
10–14	10	(9 to 12)	5	(5 to 6)
15 or more	12	(10 to 13)	4	(3 to 5)
Father's social class at 16 years	n = 3387		n = 3783	
I or II	36	(34 to 37)	34	(32 to 35)
III A or B	46	(45 to 48)	48	(46 to 49)
IV or V or others	18	(17 to 20)	19	(17 to 20)
Maternal education	n = 3068		n = 3455	
Achieved A levels or higher degree	22	(20 to 23)	20	(19 to 21)

DISCUSSION

In this longitudinal population-based sample, binge drinking in adolescence was associated with an increased risk of a wide range of adverse adult outcomes. These included adult alcohol dependence/abuse, regular alcohol consumption higher than recommended levels, illicit drug use and social adversity, including lower social class, history of homelessness, poorer educational outcomes and convictions. These findings were robust to adjustment for socioeconomic status and adult alcohol consumption. US studies have reported that the onset of, or an increase in, binge drinking behaviour during adolescence is associated with an increased risk of alcohol

Table 2 Adult outcomes of binge drinking in adolescence

		Proportions with adult outcome			OR for risk of adult outcomes posed by binge drinking in adolescence			
		Binge drinking in adolescence	Others		OR adjusted for socioeconomic factors and sex		OR adjusted for socioeconomic status, sex and baseline status where appropriate*	
Outcome at 30 years	n	%	%	p Value	OR (95% CI)	p Value	OR (95% CI)	p Value
Professional or managerial social class	4749	39	45	0.002	–		0.7 (0.6 to 0.9)	0.001
Alcohol dependency (CAGE high scorer)	4775	17	11	<0.0001	1.6 (1.3 to 2.0)	<0.0001		
Regular alcohol consumption > recommended units per week (14 in females, 21 in males)	3994	43	30	<0.0001	1.7 (1.4 to 2.1)	<0.0001		
Used illicit drugs in past 12 months	4812	24	16	<0.0001	1.7 (1.3 to 2.1)	<0.0001	1.4 (1.1 to 1.8)	0.008
Heavy smoker (⩾ 11 cigarettes per day)	4850	19	12	<0.0001	1.7 (1.3 to 2.1)	<0.0001	1.0 (0.7 to 1.3)	0.8
Psychiatric morbidity (Malaise score ⩾ 7)	4859	15	14	0.4	1.2 (0.9 to 1.6)	0.11	1.4 (1.1 to 1.9)	0.03
History of mental health problems since 16 years	4852	24	24	0.7	1.1 (0.9 to 1.3)	0.4	1.1 (0.9 to 1.4)	0.4
History of homelessness since 16 years	4481	7	4	0.001	1.6 (1.1 to 2.4)	0.02		
Conviction (civil or criminal) since 16 years	4820	14	7	<0.0001	2.2 (1.6 to 2.9)	<0.0001	1.9 (1.4 to 2.5)	<0.0001
History of being permanently excluded from school	4812	2	0.6	<0.0001	3.9 (1.9 to 8.2)	<0.0001		
Left school without any qualifications	4854	24	20	0.002	1.3 (1.1 to 1.6)	0.02		
Significant accident since 16 years	4852	58	49	<0.0001	1.4 (1.1 to 1.6)	0.001		
Pregnancy ⩽ 18 years (females only)	2185	4	3	0.6	0.9 (0.4 to 2.3)	0.9		

The table shows the participants exhibiting each adult outcome as a percentage of the number of participants who reported two or more episodes of binge drinking in the previous 2 weeks in adolescence compared with those who reported one or no episodes (others). ORs are then shown for risk of each adult outcome for two or more episodes of binge drinking compared with one or no episodes. ORs are shown first unadjusted and then adjusted for sex and socioeconomic factors (father's social class at 16 years, maternal educational attainment at 16 years and own social class at 30 years).
*The ORs shown have been adjusted for socioeconomic factors and baseline status where appropriate (models for adult drug use were adjusted for adolescent illicit drug use in the past year; smoking was adjusted for adolescent regular smoking (one or more cigarettes per week); the model for convictions was adjusted for being formally cautioned by the police between the ages of 10 and 16 years); psychiatric morbidity and history of mental health problems were adjusted for adolescent GHQ score. Note that alcohol outcomes were not adjusted for adolescent consumption as these data are shown in table 4.

Table 3 Adolescent binge drinking and frequency of regular drinking as predictors of adult outcomes

		ORs adjusted for all predictors and socioeconomic status, sex and baseline status where relevant	
Outcomes at 30 years	**Predictors at 16 years**	**OR (95% CI)**	**p Value**
Professional or managerial social class*	Binge drinking	0.7 (0.6 to 08)	<0.0001
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.4 (1.2 to 1.6)	<0.0001
	Two or more times per week	1.2 (1.0 to 1.5)	0.05
	Interaction term		0.9
Alcohol dependency (CAGE high scorer)	Binge drinking	1.4 (1.1 to 1.9)	0.02
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.5 (1.1 to 1.9)	0.004
	Two or more per week	1.6 (1.1 to 2.2)	0.009
	Interaction term		0.3
Regular alcohol consumption > recommended units per week	Binge drinking	1.3 (1.1 to 1.7)	0.01
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.5 (1.3 to 1.9)	<0.0001
	Two or more times per week	1.9 (1.5 to 2.4)	<0.0001
	Interaction term		0.11
Used illicit drugs in past 12 months*	Binge drinking	1.1 (0.8 to 1.4)	0.5
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.7 (1.3 to 2.1)	<0.0001
	Two or more times per week	2.0 (1.5 to 2.8)	<0.0001
	Interaction term		0.08
Heavy smoker (⩾ 11 cigarettes per day)*	Binge drinking	(0.6 to 1.3)	0.7
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.3 (1.0 to 1.8)	0.08
	Two or more times per week	1.1 (0.7 to 1.6)	0.7
	Interaction term		0.7
Psychiatric morbidity (Malaise score ⩾ 7)*	Binge drinking	1.3 (0.9 to 1.9)	0.11
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.2 (0.9 to 1.6)	0.16
	Two or more times per week	1.2 (0.8 to 1.7)	0.4
	Interaction term		0.08
History of mental health problems since 16 years*	Binge drinking	1.0 (0.8 to 1.4)	0.9
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.2 (1.0 to 1.5)	0.06
	Two or more times per week	1.3 (1.0 to 1.7)	0.10
	Interaction term		0.3
History of homelessness since 16 years	Binge drinking	1.5 (0.9 to 2.3)	0.11
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.0 (0.7 to 1.6)	0.9
	Two or more times per week	1.2 (0.7 to 2.1)	0.4
	Interaction term		0.3
Conviction (civil or criminal) since 16 years*	Binge drinking	1.6 (1.2 to 2.3)	0.006
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.2 (0.9 to 1.7)	0.3
	Two or more times per week	1.4 (1.0 to 2.2)	0.07
	Interaction term		0.9
History of being temporarily excluded from school	Binge drinking	3.4 (1.4 to 8.1)	0.006
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	0.6 (0.2 to 1.6)	0.3
	Two or more times per week	1.3 (0.5 to 3.7)	0.6
	Interaction term		0.4
Left school without any qualifications	Binge drinking	1.3 (1.0 to 1.6)	0.05
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	0.9 (0.7 to 1.1)	0.2
	Two or more times per week	1.0 (0.8 to 1.3)	0.9
	Interaction term		0.004
Significant accident since 16 years	Binge drinking	1.3 (1.1 to 1.6)	0.005
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.0 (0.8 to 1.2)	0.8
	Two or more times per week	1.1 (0.9 to 1.3)	0.6
	Interaction term		0.06
Pregnancy ⩽ 18 years (females only)	Binge drinking	0.7 (0.3 to 1.5)	0.3
	Frequency of regular drinking		
	Rarely or never	1	
	Weekly or less often	1.6 (0.7 to 3.6)	0.3
	Two or more times per week	3.2 (1.3 to 7.8)	0.01
	Interaction term		0.8

*Analyses also adjusted for baseline status where appropriate.

abuse/dependence and other substance use[11 13 14] as well as poorer educational attainment[11 13 14] and higher involvement in crime[13 14] in the transition to adulthood (age 21–23 years). Our findings confirm that later adversity is associated with binge drinking in British young people, with odds ratios suggesting an approximately 1.5- to 2-fold increased risk of adult convictions, school problems and illicit drug use, similar to the findings from US studies.[13 14] Our findings are also in agreement with the recent report of an Australian longitudinal study which found that adolescent binge drinking increased the risk of alcohol dependence at 20–21 years.[12] As the age of outcome in our study was 30 years, significantly older than in the US or Australian studies mentioned above, our findings suggest that this previously identified adversity associated with binge drinking continues into adult life. These findings suggest that binge drinking in adolescence may contribute, along with other health risk behaviours,[29–31] to the development of health and social inequalities during the transition from adolescence to adulthood.

We hypothesised that adolescent binge drinking is a separate behavioural pattern from habitual frequent alcohol consumption. We examined this by entering binge drinking and frequent regular drinking as main effects and examining the interaction between the two. Although binge drinking and regular drinking were highly correlated, we found that they appear to have different effects on later adversity. Binge drinking and frequent regular drinking both independently predicted a higher adult risk of alcohol use problems, including both alcohol dependency/abuse and excessive regular alcohol consumption. However, a different pattern was seen for non-alcohol adult outcomes. Binge drinking also predicted a higher risk of adult convictions, accidents and school exclusion and a lower risk of attaining high adult social class; in contrast, habitual frequent drinking was not associated with these outcomes but was associated with higher adult social class and higher risk of adult illicit drug use.

These different patterns suggest that binge drinking in adolescence may represent a behavioural pattern that increases the risk of later social, educational and socioeconomic adversity.[32] These associations may be explained by behaviours or temperamental factors previously reported to be associated with adolescent binge drinking, including impulsive acts and violence.[9 33] In contrast, high regular alcohol use, when adjusted for binge drinking, increased the risk of problematic drinking and illicit drug use in adulthood, but was not associated with other poor adult outcomes. Indeed, high regular use was associated with better adult socioeconomic outcomes, whereas binge drinking was associated with poorer socioeconomic outcome. These findings of different patterns of outcomes for binge and high regular drinking are supported by previous work which suggests that intensity of alcohol use and behavioural problems may represent separate dimensions of problem drinking in adolescence,[21] and by recent UK evidence from national datasets that frequency of drunkenness is a better predictor of offending behaviour than frequency of drinking per se.[9]

Our findings may be of policy importance for interventions around drinking in young people. Public health efforts have focused on reducing overall alcohol intake amongst adolescents and young adults through community education programmes around safe drinking, school- or college-based interventions, or higher-level measures such as increasing the price of alcohol and reducing access to alcohol for young people.[5] However, the fact that young people perceive that little risk is associated with binge drinking[5] may reduce the effectiveness of targeted interventions to reduce harmful drinking. Indeed, one UK study reported that, although 65% of student binge drinkers were aware that their level of drinking was dangerous, only 5% desired to drink less.[34] Our finding that adolescent binge drinking significantly increases the risk of adult adversity and social exclusion supports the consideration of policy interventions specifically targeted at binge drinking, particularly as adolescent drinking patterns are highly influenced by alcohol pricing and access issues.[5] Given increasing evidence that health risk behaviours cluster in adolescents,[32] and that adolescent smoking and antisocial behaviour predict young adult alcohol dependence,[12] we believe that policy around alcohol use in adolescence should also address resiliency and risk factors relating to the co-occurrence of adolescent health risk behaviours in addition to issues and behaviours specific to alcohol use.

STRENGTHS AND LIMITATIONS

We report findings from a large national birth cohort which provides data on commonly used markers of alcohol use and abuse in adolescence and adulthood. Data were available on a wide range of adult outcomes. Alcohol abuse or dependency was assessed using a scale (CAGE) validated in large community samples. We controlled our analyses for socioeconomic factors likely to bias the associations between adolescent binge drinking and adult outcomes.

The main limitation of the study is that data on alcohol use at 16 years are available for only 55% of the cohort. However, we believe that findings on alcohol use from this group are generalisable to the whole cohort. Lower participation in the 16-year survey was largely due to factors external to the subjects rather than subject non-participation, and the 16-year survey was representative of the birth cohort, with only minor loss of those from lower social classes. Those for whom data on alcohol use at 16 years were not available were only marginally more likely to be of lower social class (defined as social classes I and II and accounting for 32%) than those who did respond (35%). Furthermore, there was no significant additional loss to follow-up at 30 years of adolescent binge or heavy drinkers.

Our analyses, including both binge drinking and regularity of alcohol consumption, may be influenced by the correlation between these variables; however, the overlap of binge and regular heavy drinking was far from complete, with less than half those who regularly drank twice or more per week reporting binges in the previous 2 weeks. A further limitation is that our binge drinking variable referred to the previous 2 weeks and may therefore not represent usual behaviour. However, we believe that our data are a useful proxy for risky episodic drinking in adolescence. First, we accepted that a single episode of binge drinking may be normal in adolescence and therefore we defined binge drinking as two or more episodes of drinking four or more drinks in a row in the previous 2 weeks. Second, the prevalence of binge drinking in this sample is similar to that reported in other studies in late adolescents.[1] Third, longitudinal studies of adolescent drinking show that patterns of alcohol use are stable over time or escalate during late adolescence.[35 36] Finally, similar time-limited variables have been used in other longitudinal studies of adolescent binge drinking.[6]

The use of self-report data on health behaviours and outcomes such as court convictions may be a source of information bias; however, this bias is likely to be in the direction of underestimating effect sizes. We acknowledge that the term binge drinking remains controversial,[4 5] and some have suggested that it should be used only to describe periods of sustained heavy drinking.[37] Others have suggested that risky single-occasion drinking, episodic heavy drinking or spree drinking would be a more useful term.[1 5] However, sustained heavy drinking is rare in early and mid-adolescence, and we

What this paper adds

- Adolescent binge drinking is a risky behaviour pattern associated with significant later adversity including a higher risk of adult alcohol dependence/abuse and other substance use and social adversity including poorer educational outcomes and crime in both sexes.
- The social adversity resulting from adolescent binge drinking appears to be largely independent of high regular alcohol use, suggesting that binge drinking represents a specific high-risk behavioural pattern of alcohol use in adolescence.

Policy implications

- Binge drinking in adolescence is associated with significant long-term adversity and poor adult outcomes.
- Binge drinking may contribute to the development of health and social inequalities during the transition from adolescence to adulthood.
- Specific attention should be paid to factors associated with increased risk of prevention of binge drinking in adolescence.
- Public health policy for adolescent binge drinking should be framed within the wider developmental context of adolescent risk behaviour, rather than be restricted to issues related to alcohol use, access and availability.

believe that it is appropriate to maintain the colloquial use of the term ''binge drinking'' in adolescence to describe brief episodes of overindulgence in alcohol. Our definition of binge drinking (four or more drinks in a row on two occasions in the previous 2 weeks) is similar to that used in previous studies in adolescence.[1 4 5 13] We were unable to determine the extent to which binge drinking carried on into adulthood as subjects were not asked about episodic drinking at 30 years.

CONCLUSIONS

Adolescent binge drinking is a risk behaviour associated with significant later adversity and social exclusion. These associations appear to be distinct from those associated with high regular alcohol use. Binge drinking may contribute to the development of health and social inequalities during the transition from adolescence to adulthood.

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Authors' affiliations

R M Viner, B Taylor, Department of Paediatrics, Royal Free & University College Medical School, University College London, London, UK

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